

## **REMARKS**

In response to the above-identified Office Action ("Action"), Applicant amends the application and seeks reconsideration thereof. In this response, Claims 13, 14, 16 and 18 have been amended, no claims have been added and Claims 11, 12, 15 and 17 have been cancelled. Accordingly, Claims 1-10, 13-14, 16 and 18-20 are pending.

The instant application is directed to a process for producing an epitaxial layer of gallium nitride (GaN) as well as to the epitaxial layers of gallium nitride (GaN) which can be obtained by said process. Such process makes it possible to obtain gallium nitride layers of excellent quality.

### **I. Amendments to the Claims**

Applicant respectfully submits Claim 13 has been amended to depend from Claims 1 or 9. Claims 14, 16 and 18 have been amended to depend from Claim 13. Accordingly, the amendments are supported by the specification and do not add new matter. In view of the foregoing, Applicant respectfully requests entry of the attached amendments.

### **II. Claim Rejections - 35 U.S.C. §102(e)**

A. The Examiner rejects Claims 11-12 and 14-15 under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,794,276 issued to Letertre et. al. ("Letertre"). Applicant respectfully traverses the rejection for at least the following reasons.

To anticipate a claim, the relied upon reference must disclose every limitation of the claim. The Examiner indicates in the outstanding Action that Claims 1-10 are allowed for the reasons mentioned in the previous Office Action. In particular, the Examiner states Letertre fails to teach or suggest depositing a silicon nitride film of between 5 to 20 monolayers; depositing a continuous gallium nitride on the silicon nitride at a temperature ranging from 400 to 600 degrees C; annealing the gallium nitride layer at a temperature ranging from 950 to 1120 degrees C; and performing an epitaxial regrowth with the gallium nitride layer at the end of a spontaneous in situ

formation of islands of gallium nitride as recited in Claim 1. See Office Action dated 2/24/2005, page 3.

In regard to Claims 11, 12 and 15, Applicant respectfully submits these claims are cancelled in the instant response. Thus, the rejection of these claims over Letertre no longer applies.

In regard to Claim 14, Applicant respectfully submits Claim 14 has been amended to depend from Claim 13 and incorporates the limitations thereof. Claim 13 has been amended to depend from Claims 1 or 9 and thus incorporates the limitations of these claims. Claim 13 further adds the limitation of the epitaxial gallium nitride layer obtained by the process of Claims 1 or 9, "wherein the threading dislocation density ranges from  $2 \cdot 10^7$  to  $1 \cdot 10^8 \text{cm}^{-2}$ ." Apparently recognizing the failure of Letertre to teach the epitaxial gallium nitride layer having threading dislocation density ranges from  $2 \cdot 10^7$  to  $1 \cdot 10^8 \text{cm}^{-2}$  as recited in Claim 13, the Examiner does not find Claim 13 is anticipated by Letertre.

Applicant has further reviewed the reference and fails to discern a portion of Letertre teaching the claimed dislocation density ranges. Instead, Letertre teaches in column 7, lines 36-39, an epitaxial (GaN) gallium nitride layer obtained by CVD, HTCVD, MOCVD, MBE or HVPE without giving any indication as to the threading dislocation density. The absence of a teaching of Applicant's claimed process (Claims 1-10) necessary for achieving the claimed dislocation density ranges as well as Letertre's failure to provide a teaching of threading dislocation density ranges from  $2 \cdot 10^7$  to  $1 \cdot 10^8 \text{cm}^{-2}$ , precludes Letertre from being relied upon as anticipatory prior art.

Thus, for at least the reason that Letertre fails to teach at least the element of threading dislocation density ranges from  $2 \cdot 10^7$  to  $1 \cdot 10^8 \text{cm}^{-2}$  found in Claim 14, Claim 14 is not anticipated by Letertre. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the rejection of Claim 14 under 35 U.S.C. §102(e).

**B.** The Examiner rejects Claims 13 and 18 under 35 U.S.C. 102(e) as being anticipated by US Pub. No. 2002/0048964 issued to Yuasa et. al. ("Yuasa"). Applicant respectfully traverses the rejection for at least the following reasons.

In regard to Claims 13 and 18, as previously discussed Claim 13 has been amended to depend from Claims 1 and 9 and Claim 18 has been amended to depend from Claim 13 and incorporate the limitations thereof. Apparently recognizing the failure of Yuasa to teach the process of Claims 1 and 9 for producing an epitaxial layer of gallium nitride (GaN), the Examiner finds Claims 1 and 9 allowable over Yuasa.

Yuasa discloses a bulk GaN layer for which threading dislocations are not uniformly distributed. See, for example, Yuasa, Figure 2. Yuasa teaches that the thick GaN layer has a threading dislocation density of about  $5 \times 10^7 \text{ cm}^{-2}$ , or alternatively  $3 \times 8 \times 10^7 \text{ cm}^{-2}$ .

Claim 13 is directed to an epitaxial gallium nitride layer grown on a substrate, which is different from bulk GaN, such as that taught by Yuasa, and further adds the limitation of "wherein the threading dislocation density ranges from  $2 \cdot 10^7$  to  $1 \cdot 10^8 \text{ cm}^{-2}$ ." The claimed process of the present invention, which leads to the original epitaxial gallium nitride layer product of Claim 13, allows for a homogenous distribution in the threading dislocations. See for example, Application, page 16, paragraph [0070]; Figure 5. As taught by Yuasa, threading dislocation density depends on the portion where the density is measured and therefore is not homogenous. See Yuasa, page 4, paragraph [0045]. This structural difference between the presently claimed layer and prior art is a direct consequence of the process recited in the present application. Thus, the failure of Yuasa to teach the claimed process of Claims 1 and 9, necessarily precludes Yuasa from teaching the resulting product of Claims 13 and 18.

For at least the foregoing reasons, Yuasa fails to teach all the elements of Claims 13 and 18, therefore anticipation may not be found. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the rejection of Claims 13 and 18 under 35 U.S.C. §102(e).

C. The Examiner rejects Claims 16 and 17 under 35 U.S.C. 102(b) as being anticipated by U.S. Patent No. 6,319,742 issued to Hayashi et. al. ("Hayashi"). Applicant respectfully traverses the rejection for at least the following reasons.

In regard to Claim 17, Claim 17 is cancelled in the instant response therefore the rejection of Claim 17 over Hayashi no longer applies.

In regard to Claim 16, Claim 16 is amended to depend from Claim 13 and incorporates the limitations thereof. As previously discussed, Claim 13 is amended to depend from Claims 1 or 9. The Examiner has not indicated Claim 13 is anticipated by Hayashi. Thus, for at least the reason that Claim 16 incorporates the elements of Claim 13 which is not anticipated Hayashi, Claim 16 is not anticipated by Hayashi.

In addition, Hayashi discloses a gallium nitride layer obtained by ELO on a crystalline substrate and thus does not teach the requisite process for achieving the product of Claim 13. Accordingly, for at least the reasons discussed above, Hayashi cannot anticipate a gallium nitride layer grown by ELO on a substrate as recited in Claim 13 and incorporated into Claim 16.

For at least the foregoing reasons, Hayashi fails to teach all the elements of Claim 16, therefore anticipation may not be found. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the rejection of Claim 16 under 35 U.S.C. §102(e).

D. The Examiner rejects Claims 19 and 20 under 35 U.S.C. 102(e) as being anticipated by U.S. Patent No. 6,794,276 issued to Vaudo et. al. ("Vaudo"). Applicant respectfully traverses the rejection for at least the following reasons.

Claim 19 depends from Claim 18, Claim 18 is amended to depend from Claim 13 and incorporates the limitations thereof. As previously discussed, Claim 13 is amended to depend from Claims 1 or 9. Claim 20 depends from Claim 19 and incorporates the limitations thereof. The Examiner has not indicated Claims 13 and 18 are anticipated by Vaudo. Thus, for at least the reason that Claims 19 and 20 incorporate the limitations of Claims 13 and 18 which are not anticipated by Vaudo, Claims 19 and 20 are not anticipated by Vaudo.

Moreover, Vaudo teaches a free standing gallium nitride layer obtained after separation from the substrate and an optoelectronic component provided with said free standing GaN. The claimed optoelectronic component (Claim 20) is obtained from the original substrate of Claim 18 and thus cannot be anticipated by Vaudo which is silent on the threading dislocation density.

For at least the foregoing reasons, Vaudo fails to teach all the elements of Claims 19 and 20, therefore anticipation may not be found. Accordingly, Applicant respectfully requests reconsideration and withdrawal of the rejection of Claims 19 and 20 under 35 U.S.C. §102(e).

### **III. Allowable Subject Matter**

Applicant respectfully acknowledges the Examiner's determination that Claims 1-10 are allowed.

### CONCLUSION

In view of the foregoing, it is believed that all claims now pending are now in condition for allowance and such action is earnestly solicited at the earliest possible date. If there are any additional fees due in connection with the filing of this response, please charge those fees to our Deposit Account No. 02-2666. Questions regarding this matter should be directed to the undersigned at (310) 207-3800.

### PETITION FOR EXTENSION OF TIME

Per 37 C.F.R. 1.136(a) and in connection with the Office Action mailed on July 29, 2005, Applicant respectfully petitions the Commissioner for a one (1) month extension of time, extending the period for response to November 29, 2005. The Commissioner is hereby authorized to charge payment to Deposit Account No. 02-2666 in the amount of \$60.00 to cover the petition filing fee for a 37 C.F.R. 1.17(a)(2) small entity. A duplicate copy of this sheet is enclosed.

Respectfully submitted,

BLAKELY, SOKOLOFF, TAYLOR, & ZAFMAN LLP

Dated: November 29, 2005

By: \_\_\_\_\_

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### CERTIFICATE OF MAILING

I hereby certify that this correspondence is being deposited with the United States Postal Service as first class mail with sufficient postage in an envelope addressed to: Mail Stop Amendment, Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450 on November 29, 2005.

Jean Svoboda